

DAYLIGHT VS NIGHT VARIATIONS IN THE RED SHRIMPS CATCHES OF THE STRAIT OF SICILY

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Abstract

The red shrimps, *Aristaeomorpha foliacea* and *Aristeus antennatus*, represent an important resource for the fisheries of the Strait of Sicily. According to fishermen, a night haul yields a smaller catch than during daylight, even if a greater proportion of large-size animals is caught. In order to check for any statistical difference between yields, sex-ratios and size frequency distributions, a few comparative night hauls were performed. In all cases the daylight catches, both in weight and number, resulted significantly higher than the night catches. The carapace length frequency distributions showed statistically significant differences, with the night catches trailing the daylight ones.

Key-words: Decapoda, Fisheries, Vertical migration, Sicilian Channel

Introduction

The red shrimps, *Aristaeomorpha foliacea* and the companion species *Aristeus antennatus* represent an important resource for the fisheries of the Mediterranean, in particular in the Strait of Sicily (Central Mediterranean Sea) [1]. As in other places, Sicilian fishermen prefer to fish the red shrimp bottoms in daylight, and target the red shrimps at night (usually doing one prolonged haul) only if no alternatives, such as banks or epibathyal grounds, are around; in fact, according to the fishermen, a night haul yields a smaller catch than during daylight, even if a greater proportion of large-size animals is caught in comparison to the daylight hauls. A similar phenomenon has been studied for *Aristeus antennatus* [2, 3, 4], and is often qualitatively reported in literature for *Aristaeomorpha foliacea*; for the latter, it has been confirmed statistically, limited to the reduction in catches, for the population of the Australian slope [5].

In order to confirm these results and to check for any statistical difference between mean weights and length frequency distributions, a few comparative night hauls were performed within the framework of a study aimed at evaluating the selectivity of the commercial bottom trawl net used for the red shrimp fishery in the Strait of Sicily [6].

Material and methods

A total of 12 night hauls (by convention those started at or after 7 p.m.) were realized, 7 and 5 in Spring and Summer 1994 respectively, and compared with one (or more) corresponding daylight haul (same day, same area); the depth of trawling was in the 500-700 m range, the duration of each haul was 3 hours and, even if the gear had different configurations, the cod-ends were covered with 14-mm (side) mesh bag. The total captured red shrimps were sorted by species and sex; the catch was weighed, counted and expressed in kg/h or n/h; the carapace length was measured (to the nearest mm) in each specimen; sexes were thereafter combined. Since the capture of *Aristeus antennatus* was modest, only data on *Aristaeomorpha foliacea* were further analyzed.

Paired t-tests were used to compare the differences in the hourly yield (in weight) and catch (in number), and in the average weight; the differences in mean weight were analyzed also with a non-parametric Wilkison's sign test. The length frequency distributions were converted to cumulative percentages and tested with the Kolmogorov-Smirnov method.

Results

The hourly capture (Table I) was very variable among the hauls but, in all cases (with the exception of the violet shrimp in hauls 50 vs 51), the daylight catches, both in weight (Fig. 1) and number (Fig 2), resulted consistently higher than the night catches.

In *Aristaeomorpha foliacea*, the overall mean differences were 219 vs 488 animals (ratio 0.45) and 5.2 kg/h vs 9.7 kg/h (ratio 0.53), for night and daylight respectively, and the probability of both t-tests was less than 0.001. For the violet shrimp the night yielded half the weight and number of the daylight hauls (Table I). As concerns the mean weight, in *Aristaeomorpha foliacea* the opposite trend was not as strong (Fig. 3); still, at a overall mean weight of 23.5 g in the night catch corresponded 19.8 g in daylight (ratio 1.19), with a probability for the t-test lower than 0.03 (the non-parametric sign test was only marginally significant, at 0.06). On the contrary, *Aristeus antennatus* did not show differences in size between daylight and night hauls.

The comparison of the carapace length frequency distributions also showed dramatic differences: in all the 11 sets the differences were statistically significant (Table II), with the night catches always

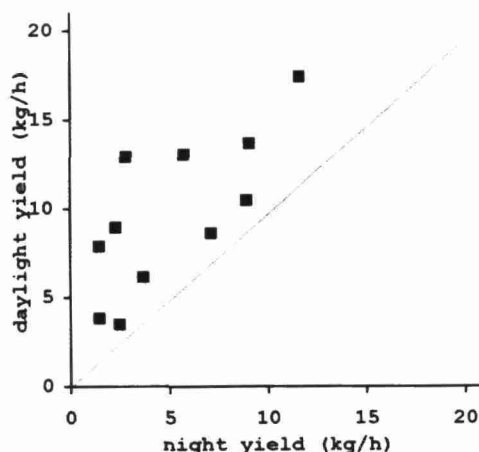


Fig. 1. Nigth vs daylight yields

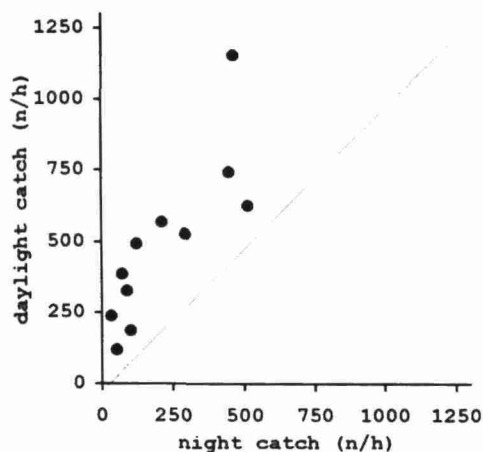


Fig. 2. Nigth vs daylight catches

but once trailing the daylight ones. Notwithstanding the smoothing due to the pooling, this behaviour was still visible in the combined data set (Fig. 4).

Discussion and conclusions

The common believing that red shrimps are caught more in daylight than during the night has been verified, for the seasons considered, at least; still, the values from this study are far from those (weight ratio night/daylight = 6.2%) reported by Rainer [5] for an Australian population of *Aristaeomorpha foliacea*.

Moreover, it appears that on average the captured animals are effectively larger in the night hauls; the length frequency distributions show that a relative "disappearance" from the catch of the smaller fraction is mainly responsible for this situation.

The red shrimps are not strictly benthic animals, and they normally inhabit the water layers close to the bottom being able to carry out horizontal and vertical displacements [4, 7].